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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB96/03008 <b>(22) International Filing Date:</b> 5 December 1996 (05.12.96)  <b>(30) Priority Data:</b> 9524860.5 5 December 1995 (05.12.95) GB 9616049.4 31 July 1996 (31.07.96) GB  <b>(71) Applicant (for all designated States except US):</b> ✓ SHERBROOKE SECURITIES LIMITED [GB/GB]; 18 Wynnstay Road, Colwyn Bay, Clwyd LL9 8NB (GB).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> ROBERTS, William, Sherbrooke [GB/GB]; Orchid Lodge, Gannock Park West, De-ganwy, Conwy LL31 9HQ (GB).  <b>(74) Agent:</b> TUNSTALL, Christopher, Stephen; Dibb Lupton Alsop, 117 The Headrow, Leeds, West Yorkshire LS1 5JX (GB).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> With international search report.
<b>(54) Title:</b> CHARGE CARD  <b>(57) Abstract</b>  A charge card is described which is made from a rubber or plastic laminate with precious metal forming the upper surface and preferably lower surface. The precious metal layers are adhered to the rubber material by means of a suitable adhesive formulation or the plastic material by a latex adhesive. The laminated card has uniquely flexible properties which render it suitable as a credit card.		

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## CHARGE CARD

The present invention relates to charge cards. For the avoidance of doubt the term charge card used herein embraces all possible kinds of card used in lieu of payment in cash or cheque. Examples of such cards include credit

5 cards such as VISA (Trade Mark), AMERICAN EXPRESS (Trade Mark) and many cards for use in specific shops or debit cards such as SWITCH (Trade Mark).

It is conventional to make charge cards from flexible  
10 plastic material. The material has to undergo rigorous testing to meet the international regulations, especially those governing flexibility and extent of elastic deformability. Some types of charge card are very exclusive. It is quite common for such cards to have a  
15 gold or platinum coloured coating on the faces thereof. These so-called gold or platinum cards are very prestigious and are usually only given to persons with sufficient assets or income.

20 A noble metal card has been described in a Japanese patent application (publication no. 3266695). This card is protected by thermally bonding transparent resin films to both surfaces of the noble metal card. Unfortunately, it is not possible to use such cards as credit cards. Credit  
25 cards require a high degree of flexibility and elasticity if they are to meet the required standards and the noble metal card described in the Japanese application deforms relatively easily but does not possess the required flexibility to return it to its original position. Instead,  
30 the metal layer becomes permanently damaged as a result of the deformation. The present invention is directed, in part, to a solution to this problem.

According to the present invention there is provided a  
35 charge card made partly from a precious metal wherein the card includes one or more layers made of a precious metal

and one or more layers made of other materials characterised in that the card comprises a layer of a rubber based material.

5

For the avoidance of doubt, a rubber based material includes:- ~~natural rubber and synthetic rubbers~~ and materials containing a substantial part of either rubber. Examples of synthetic rubbers include neoprene, isoprene, butadiene and copolymers of these substances. A composite material having an internal fibre or fabric web can be used. One example is polychloropropene coated fibre fabric of plain weave construction. Such composite materials combine flexibility and added strength. Other rubber based composites fall within the scope of this invention.

The term precious metal used herein includes high value metals such as platinum, gold (at all carats) and silver.

Preferably, a three part laminate is formed comprising outer layers of precious metal and an inner layer of the rubber based material. The layers of precious metal are, preferably, bonded to the inner rubber based layer by means of a suitable adhesive. Such adhesives are known to those skilled in the art.

The card may be coated with a suitable coating to give a durable, flexible and rugged finish. Advantageously, optional further components of the card such as a hologram, a signature pad, a magnetic strip, a photograph identification strip and a card company identifier can be affixed to the coated layer which may be of plastic material is more suitable than the surface of the precious metal itself.

35

A preferred embodiment is acrylic isocyanate which is a clear plastic typically sprayed onto the card. This coating allows bonding of a signature patch etc to it.

Advantageously, the provision of a rubber based layer adjacent to the thin layer(s) of metal sheet results in an unique feel to the card and gives the flexibility to the card necessary to mimic the feel of a credit card. In addition, in the three part laminate, the provision of the inner rubber based layer gives flexibility whilst retaining the appearance of a solid metal card. In particular, the card is sufficiently elastic to allow a surprisingly high degree of deformation. In addition, the rubber based layer gives enhanced slip properties to the product. Slip properties are crucial in preventing the creasing or folding of the acting inner metal layer and in preventing stretching of the acting outer metal layer during flexion. The rubber based layer naturally deflects the stresses at the interface of the inner surface of the outer metal layer and the surface of the rubber based layer into the interior of the rubber based layer and thus considerably reduces the stresses at the interface. The reduced stress at the interface prevents the metal layer from separating from the rubber based layer and damaging the card.

A further unexpected advantage of the metal/rubber combination is the overall feel of the charge card and its considerable degree of flexibility. The use of the same plastic material as that used in ordinary credit cards does not impart sufficient flexibility to the precious metal layers and results in a more brittle and easily damaged card. As the edges of the rubber layer can be masked at the peripheral edge of the card it is possible to present the appearance of, for example, a solid gold card with an uniquely flexible feel which adds to the attractiveness of the card.

The layered charge card in accordance with the present invention may be provided with the usual "information" presented thereon, including the signature of the card owner and his photographic representation as well as other details such as the card number, expiry date and the

hologram. This information may be presented on one or both outer surfaces of the inner rubber based layer and may be seen through windows in the outer precious metal layers. Alternatively and preferably, it may be presented on the 5 outer metal layers themselves, for instance, by suitable engraving processes including laser etching processes or ~~alternatively by stamping processes. A further alternative~~ and most preferred method is to apply a protective coat to the metal layers and apply the further details to the 10 coating. Combinations of these methods may be also utilised.

As indicated previously, a preferred charge card in accordance with the present invention includes an inner 15 rubber based layer and outer gold layers. The total thickness of the card is typically the same order of thickness (0.760mm) as that of a conventional charge card.

A laminated charge card in accordance with the present 20 invention may be in the form of an inner rubber layer and outer layers of gold or other suitable precious metal, the gold may extend around the edges of the charge card to conceal the presence of the inner rubber layer.

25 Uniquely, the invention thus solves the problem of providing a "real" precious metal charge card with the flexible and resilient properties expected of an ordinary charge card.

30 In an alternative embodiment, a layer of plastics material bonded to a layer of precious metal by latex adhesive can be envisaged.

The plastic layer can be the same sort of plastics as that 35 used in conventional credit cards.

In a three part laminate, two layers of precious metal are bonded to the inner plastics layer by means of a latex adhesive. Preferably the latex adhesive is in a continuous

layer between the plastics layer and metal layer, though it may be not continuous.

Advantageously, the card may be coated with a polyurethane  
5 lacquer to give a durable, flexible and rugged finish.

Advantageously, the provision of a central plastic layer sandwiched between thin outer layers of metal sheet effectively retains many of the plastic qualities in the  
10 card while retaining the genuine appearance of a precious metal card. In addition, the provision of a laminate improves flexibility whilst retaining the appearance of a solid metal card. In particular, the card possesses flexibility and is sufficiently elastic to allow a high  
15 degree of deformation. The latex adhesive adds to the flexibility of the laminate and gives enhanced slip properties to the product. Slip properties are crucial in preventing the creasing or folding of the inner metal layer and in preventing stretching of the outer metal layer  
20 during flexion.

Common adhesives, although adequate for some purposes, have insufficient long term durability under different conditions to maintain adhesion of the layers. This  
25 results in peeling of the metal layer, usually at the edges, with resultant tearing and other damage. This problem is overcome by providing outer protective layers of a polyurethane lacquer.

30 The preferred laminated charge card in accordance with the present invention may be provided with the usual "information" presented thereon, including the signature of the card owner and his photographic representation as well as other details such as the card number, expiry date and  
35 the hologram. This information may be presented on one or both outer surfaces of the inner plastics layer and may be seen through windows in the outer precious metal layers. Alternatively and preferably, it may be presented on the outer metal layers themselves, for instance, by suitable

engraving processes including laser etching processes or alternatively by stamping processes.

A particular preferred charge card in accordance with the present invention includes an inner plastics layer and outer gold layers. The total thickness of the card is typically the same order of thickness (around 0.8mm though the ISO standard of 0.76mm is preferred) as that of a conventional charge card.

10 A laminated charge card in accordance with the present invention may be in the form of an inner plastics layer and outer layers of gold or other suitable precious metal, the gold may extend around the edges of the charge card to  
15 conceal the presence of the inner plastics layer. Alternatively, to provide extra strength a perimeter gasket may extend around and partially overlap the edges of the charge card. It may also peripherally overlap the faces of the charge card to the extent that it conceals the edges of  
20 the precious metal layers and thus significantly reduces the likelihood of peeling.

Preferably, a stamping process is employed to conceal the edges of the inner layer with the precious metal sheets.  
25 The stamps are concavely curved at the edges so as to force overlapping edges of the precious metal sheet towards the edges of the plastic. In this manner the overlapping edges of the lower and upper layer are forced toward each other during the stamping process so as to meet and effectively  
30 conceal the inner plastic layer. Care has to be taken so that the edges of the precious metal sheets do not abut against edges of the plastic layer and thus hinder the flexibility and slip properties provided by the sandwiched arrangement of the layers.

35 In order that the present invention may be more readily understood a specific embodiment thereof will now be described by way of example only with reference to the accompanying drawings in which:



Figure 1 shows one face of a charge card in accordance with the present invention; and

Figure 2 shows the reverse face of the charge card of Figure 1.

Referring to the drawings a charge card 10 is made to conventional size (55mm x 86mm x 0.76mm) in a forge from a precious metal such as gold, which are then placed to sandwich a rubber sheet to charge card dimensions. The gold layers are each 200 micron thick and the rubber layer is 360 micron thick. The outer precious metal layers 20, 22 are bonded to the inner layer 24 by means of a suitable adhesive.

Inner layer 24 can be rubber, or a rubber based composite such as double faced neoprene (polychloropropene) coated fibre fabric of plain woven construction.

Alternatively, inner layer 24 could be of plastics material and latex adhesive in a continuous, or periodic, layer could be used.

A thin coat of the adhesive is applied to the inner layer prior to forging. Highly polished gold layers are adhered to the inner layer and the five layer laminate structure is pressed together under heat in a heat press. It is thought that this results in a change in the molecular structure of the inner rubber layer and adhesive to form a key bonding agent for adhering with the gold. Thereafter the cards are stamped out to appropriate dimensions. Variations in these thicknesses can be effected and these may be necessary in order to comply with ISO standards for charge cards. The variations in thicknesses may also be necessary in order to accommodate the final coating of, for example, acrylic isocyanate or polyurethane lacquer on the charge card without exceeding the ISO standard thickness.

Alternatively, and particularly when a rubber inner layer is provided, the coating is any suitable transparent plastic material such as acrylic isocyanate which will have minimum effect on the clarity of the gold layer as seen in  
5 the final card. Generally, the coating is baked on to encapsulate the card. Auxiliary card elements such as the ~~hologram, magnetic strip and, if necessary, the signature~~ patch are adhered to the plastic coating layer. Or, where a polyurethane lacquer is used, this same formulation can  
10 be used to adhere the hologram, magnetic strip etc to the gold layers, the polyurethane lacquer gives a durable flexible and rugged finish. A preferred coating is clear acrylic isocyanate which allows bonding of a signature patch etc and is less prone to cracking on flexing.

15  
Laser etching is used to etch the gold to high definition and, optionally, the signature of the user may be laser etched or provided in the conventional manner by a signature patch and photograph. The account numbers and  
20 name of the card holder are embossed onto the gold layer. Advantageously, to conform with ISO standards, the card can be milled out to provide a recess of 600 micron to accommodate SMART card technology and can thereafter be embossed. The recess could be provided by milling using  
25 conventional mechanical technology or laser etching, or by forming an aperture in the layers prior to lamination. Tests have shown that the peel strength is an important factor if the card is to meet the required ISO, European and British standards. The number 11 attached to the card,  
30 the dates 12,13 of first validity and expiry and the name 14 of the card owner are all embossed into card.

Prior to coating, due to the use of precious metals, the cards are assayed at the Assay Office in the United Kingdom  
35 or at the appropriate office in other countries.

The brand 15 of the particular type of card is etched onto the gold layer of the card prior to coating or printed onto the plastic cover by screen printing and laser etching or

stamping. The magnetic strip 16 is attached to the rear of the coated card using adhesive. A signature patch 17 for the authorised signature of the card owner is likewise attached to the rear of the card using adhesive. It is  
5 conventional to secure holograms to charge cards in order to prevent forging. Such a hologram 18 may be secured in place on the coated card by adhesive as described.

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It is to be understood that the above described embodiment  
10 has been made by way of illustration only. Many modifications and variations are possible. For example the dimensions of the card can be different, in particular the thickness. The thickness of the card is ideally in the range from 0.25mm to 1mm.

CLAIMS

1. A charge card made partly from a precious metal wherein the card includes one or more layers made of a precious metal and one or more layers made of other materials characterised in that the card comprises a layer of a rubber based material.  
5
2. A charge card as claimed in claim 1, characterised in that the card is formed from a three layer laminate including outer layers of precious metal and an inner layer comprising the rubber based material.  
10
3. A charge card according to claim 2, in which the inner layer of rubber based material is of greater thickness than each of the outer layers of precious metal.  
15
4. A charge card according to claim 3, in which the inner layer of rubber based material is substantially equal to 360 microns in thickness and/or the outer layers of metal are substantially equal to 200 microns in thickness.  
20
5. A charge card according to any preceding claim, in which the rubber based layer is bonded to the precious metal layer by a suitable adhesive.  
25
6. A charge card according to any of claims 2-5, in which the rubber based material is a synthetic rubber.
- 30 7. A charge card according to claim 6, in which the synthetic rubber is polychloropropene.
8. A charge card according to any preceding claim, in which the inner layer is a composite material.  
35
9. A charge card according to claim 8 in which the composite material of the inner layer comprises a polyester or nylon fibre fabric.

10. A charge card according to claim 8 or 9, in which the composite material comprises polychloropropene coated polyester fibre fabric.
- 5 11. A charge card according to claim 9 or 10, in which the fibre fabric is of plain weave construction.
- 
- 10 12. A charge card according to claim 1, in which the rubber based material is a latex adhesive and a layer of a plastic material is bonded to a layer of the precious metal with the adhesive.
- 15 13. A charge card according to claim 12, in which the card is formed from a three part laminate including outer layers of precious metal and an inner layer of a plastic material.
- 20 14. A charge card as claimed in any preceding claim, wherein a coating of polyurethane lacquer or acrylic isocyanate is applied to provide the exterior finish for the card.
- 25 15. A charge card as claimed in any of claims 1 to 13, in which a transparent coating of plastic is applied to provide the exterior finish for the card.
- 30 16. A charge card as claimed in any preceding claim, in which a transparent coating of plastic is applied to provide a surface for affixing auxiliary card elements.
17. A charge card according to any preceding claim, in which the precious metal is gold.
- 35 18. A charge card according to any preceding claim, in which the card is formed from a three layer laminate, having an inner rubber or plastic layer and outer metal layers, the outer layers extending around the edges of the inner layer to conceal its presence.

19. A charge card according to claim 18, in which the edges of the outer metal layers overlap about the edge of the inner plastic or rubber layer.
- 5 20. A charge card according to claim 19, in which the overlapping edges of the metal layers do not abut the edge of the plastics layer.
- 10 21. A charge card according to any of claims 1-17, in which a perimeter gasket extending around and partially overlapping the edges of the card is provided.
- 15 22. A charge card according to claim 21, in which the gasket conceals the edges of the precious metal layer or layers.
- 20 23. A charge card according to any preceding claim, in which a recess is provided to accommodate smart card technology.
24. A method of manufacturing a charge card comprising the steps of:
- 25       a) adhering a layer of a rubber based material to at least one precious metal layer to form an at least two part laminate;
- or       b) if the rubber based material is an adhesive, adhering a layer of a plastics material to at least one precious metal layer to form an at least two part laminate; and
- 30       c) stamping the laminate to form a card of charge card dimensions.
25. A method according to claim 24, in which a three part laminate with outer layers of metal is formed.
- 35 26. The method of claim 24 or 25, which includes the step of coating the metal layer(s) with a transparent plastic prior to stamping.

27. The method of claim 24 or 25, which includes the step of coating the metal layer(s) with a transparent plastic after stamping.
- 5 28. The method of any of claims 24 to 27, which includes the step of affixing auxiliary card elements to the card.
- 10 29. The method of claims 26, 27 or 28, which includes completely encapsulating the metal layer(s).
30. A charge card substantially as hereinbefore described with reference to the drawings.
- 15 31. A method of producing a charge card substantially as hereinbefore described with reference to the drawings.

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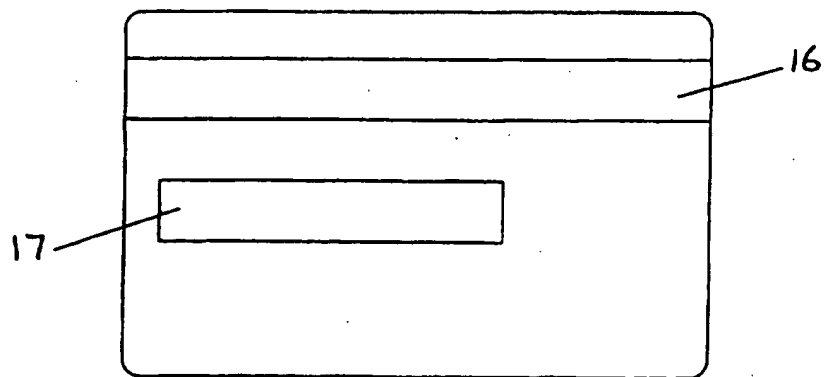
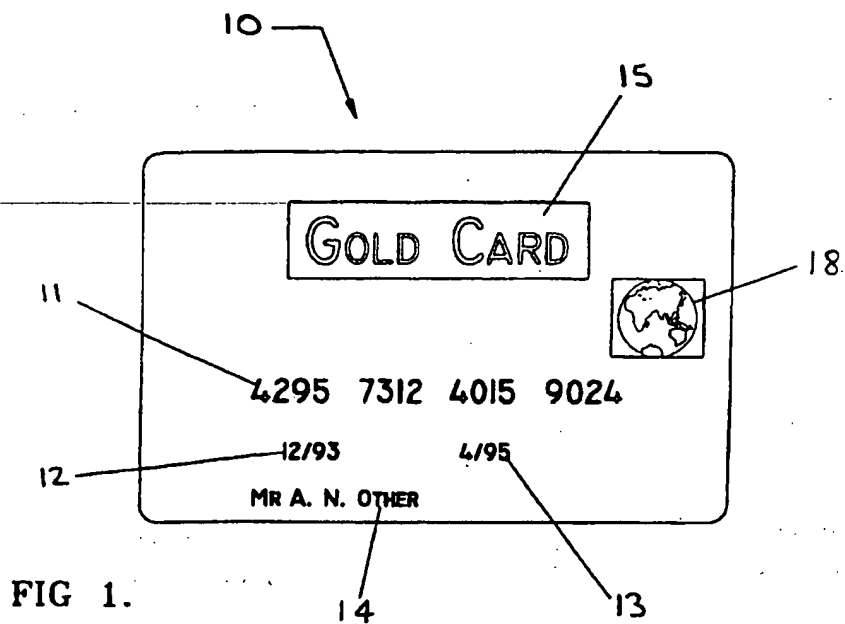


FIG 2.



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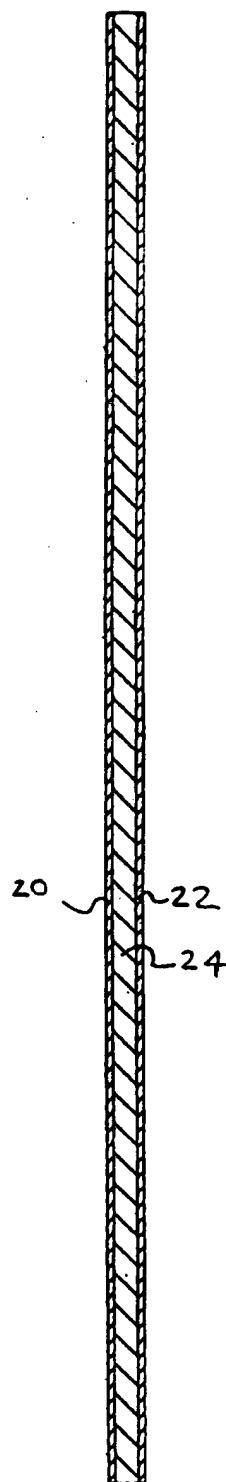


FIG 3.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 96/03008

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B32B15/06 G06K19/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

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IPC 6 B32B G06K

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 082 (M-1215), 27 February 1992 & JP 03 266695 A (MITSUI MINING & SMELTING CO LTD), 27 November 1991, cited in the application see abstract --- -/--	1,24

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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 094 (M-1219), 9 March 1992 & JP 03 275355 A (MITSUI MINING & SMELTING CO LTD), 6 December 1991, see abstract ---	1,24
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Information on patent family members

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